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ABSTRACT

This report provides concerned citizens and educators with information about the attainment of educational objectives in the United States. In light of science objectives, exercises assessing knowledge, skills, and other educational achievements were administered to randomly selected 9, 13, and 17-year-olds, and young adults (26 to 35). This document reports study highlights, explaining what young people know about specific questions or tasks, what information or skills they have, and what misinformation they possess. A related document is EA 003 034. (Author/LLR)

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NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

A Project of the Education Commission of the States

SUMMARY OF REPORT 1

SCIENCE: NATIONAL RESULTS

JULY, 1970

EA 003 035

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS

A Project of the Education Commission of the States

Tom McCall, Governor of Oregon, Chairman, Education Commission of the States
Wendell H. Pierce, Executive Director, Education Commission of the States
James A. Hazlett, Administrative Director, National Assessment

Assessment Reports

#1	Science: National Results	July, 1970
#2	Citizenship: National Results -- Partial	July, 1970

In addition to the detailed reports of National Assessment, brief summaries of the results and commentaries by a panel of reviewers and also being printed.

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This summary was prepared to give readers an overview of the first National results of the National Assessment in Science, which are reported in detail in National Assessment Report 1. This summary has been prepared by Clifford L. Dochterman, Director of Public Information, Education Commission of the States.

Summary - - Report 1

SCIENCE: NATIONAL RESULTS

Background

What do young people really know? How are the results of our fifty billion dollar annual expenditures on education to be assessed? What is the level of educational achievement of the nation's students and young adults? Are the schools of America doing a good job teaching young people how to read, how to understand and appreciate science, how to develop good attitudes of citizenship, how to write with clarity? How adequately are they performing all the other tasks customarily assigned to them? These, and a host of other questions, led to the development of a systematic plan to gather information and report to the nation about the knowledge, skills, attitudes and understanding of young people at several age levels and the educational progress they are making.

The plan, begun in 1964 by the Exploratory Committee on Assessing the Progress of Education,[1] is to collect information about the knowledge

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[1] National Assessment was encouraged in 1963 by Francis Keppel, then U. S. Commissioner of Education. The first chairman of ECAPE was Dr. Ralph W. Tyler, then director of the Center for Advanced Study in the Behavioral Sciences at Stanford, California. The early funding for National Assessment came from the Carnegie Corporation of New York, of which John Gardner was President. Later funds were received from the Ford Foundation's Fund for the Advancement of Education. The major funds for National Assessment are now provided by grants to the Education Commission of the States from the U. S. Office of Education's National Center for Educational Research and Development and the Carnegie Corporation.

and skills held by 9, 13, and 17-year-olds and of young adults (26 to 35) in 10 subject areas taught in schools: Citizenship, Science, Art, Career and Occupational Development, Literature, Mathematics, Music, Reading, Social Studies, and Writing. Selected subject areas will be assessed each year with emphasis on assessment of each area at appropriate intervals to show where we are going ahead and where we are falling behind. During 1969 the first assessments were conducted for all four age levels in three subject areas - - Citizenship, Science, and Writing. This sampling, involved a total of approximately 100,000 persons, carefully selected to represent the whole country.

The first step in developing the plan for National Assessment was to determine a list of educational objectives for each subject. These objectives served as a guide in preparing exercises designed to assess what young people actually know. The objectives were reviewed by interested citizens, subject matter specialists, and educators to assure they are currently and generally accepted as proper goals of education.

The second step was to develop "exercises" assessing knowledge, skills and other educational achievements. Since attitudes, skills, and other behavior were to be assessed in addition to general textbook knowledge, it was important to use a variety of approaches: questionnaires, interviews, observation, and performance tasks - - as well as the traditional multiple choice and short answer paper and pencil questions.

The next step was to select individuals in schools, (household for the adult and out of school 17-year-olds) on a random and statistically valid basis who would participate in the assessment, conducted by a

trained staff of administrators. No attempt is made to determine norms or individual scores. National Assessment does not provide information about how well Johnny did, or where Suzy stands in relation to Joe. It is a census-like data gathering process to tell what groups of young people at a certain age level know and do not know (i.e. 67% of 13-year-olds know this to be true, etc.)

The reports tell what young people know about specific questions or tasks, what information or skills they have, and what misinformation they believe. For example, the detailed report on science lists about 190 specific exercises,[2] and gives the percentage making each response. These data provide information to school administrators, curriculum specialists, science teachers, school boards, legislators, scientists and interested lay citizens. Not only do the results show the knowledge and skill of various age groups, but they point out misconceptions and lack of skills. National Assessment reports are planned to be readily understood by parents and other interested layman. Actual examples of performance give a clearer picture of achievements than a test score, or some other abstract measures.

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[2] Although the complete assessment involved many more exercises, about 40% were selected as representative of the total to be publicly released at this time. The remaining 60% of the exercises will be used in subsequent assessments to measure change in performance over a period of time.

THE REPORT

National Assessment exercises were designed to cover the range from easy to difficult. From the easiest exercises it is possible to report samples of those skills, knowledges and understandings possessed by almost all young people. Certain exercises were prepared with a somewhat higher level of difficulty to indicate the knowledge of "average" or typical young persons. Finally, those exercises with the highest degree of difficulty illustrate the knowledge and skills of the most able or most knowledgeable young persons.

When the same exercise is administered at more than one age differences of knowledge, skills and understanding can be compared. When identical exercises were given to 9, 13 and 17-year-olds the percentage responding correctly increased with age. Although the age 17 group seemed to have more classroom or textbook knowledge, young adults did better in some of the more practical categories.

HIGHLIGHTS FROM THE AGE 9 ASSESSMENT

The facts and principles of science best known to the 9-year-old are simple commonplace phenomena and the properties of matter, such as rocks are solid (84%), pine trees stay green all winter (80%); thick dark clouds usually bring rain (87%), iron does not burn by ordinary means (89%); a stick should be dry in order to burn (92%); a human baby comes from its mother's body (92%); and day and night occur because the earth rotates (81%). The 9-year-olds did fairly well in

identifying simple characteristics of scientific experiments. When asked whether a man who keeps records about how fast seeds grow is possibly doing a scientific experiment, 91% responded affirmatively. Although they were not required to explain the reason why a balloon which was rubbed against the wall adhered to the wall without falling, 78% of the youngsters agreed that there was a scientific reason for the phenomenon.

As exercises become more abstract and complex fewer 9-year-olds succeeded. Only 22% recognized a suitable definition of a "scientific theory" (e.g. it explains why some things act the way they do,) while others thought it described an experiment (27%), described a scientist (12%) or told all there is to know about something (18%).

A substantial number of the 9-year-olds were able to demonstrate ability and skill in using simple scientific apparatus and conducting simple scientific analysis. Given a beam balance, 96% were able to perform the elementary task of balancing two weights on the beam, and 94% could perform the slightly more complex task of counter-balancing two weights with a third weight.

Familiarity with a common playtime experience illustrated another means whereby the youngster used a scientific principle. When confronted with the problem of a leaking bicycle tire, 72% correctly responded that the necessary first step in solving the problem was to "find where the air leaks out of the tire." The value of experimentation to check a hypothesis was illustrated in another exercise. When asked how to test the suggestion

that you could actually make salt water taffy by mixing salt, sugar and water, 66% of the 9-year-olds correctly said that the best way to test the suggestion was to mix the three ingredients and see what happens.

Many 9-year-olds (66%) were also able to analyze a simple respiration table and draw the conclusion that "younger people breathe faster than older persons". Similarly, the 9-year-olds were able to determine from two other simple tables correct responses to questions on temperature and body chemicals.

For example, 59% of the 9-year-olds knew that most plants get most of their water directly from the soil; 52% knew the sun is a star; 44% knew that houseflies can spread serious human disease; 52% knew that a schoolroom is most comfortable at about 70 degrees. Half of the 9-year-olds knew that widespread vaccination is why few people get smallpox today. Only 35% were aware that a quart of mercury would weigh more than an equal volume of air, sawdust, or water. About half (48%) chose water as the heaviest of the listed materials perhaps because of their unfamiliarity with mercury.

Particular misconceptions were frequent in some difficult questions. Only 15% knew that coal was formed from dead plants rather than volcanic lava (selected by 56%). Most (69%) thought incorrectly that the mixing of two equal quantities of water at 70 degrees and 50 degrees would result in an overall temperature increase to 120 degrees, rather than a temperature somewhere between the temperatures of the two original solutions. Only 7% of the 9-year-olds gave the correct answer: 60 degrees.

One instance where the students found difficulty in relating facts to a specific problem was in an exercise regarding the freezing point of water. Where ice melts to water at 32 degrees Fahrenheit, when would freezing take place if the water is cooled from 40 degrees? While 17% answered correctly, (32 degrees) 31% said 30 degrees or even lower, and 30% said 34 degrees or higher.

The responses of 9-year-olds to questions relating to science and superstition were intriguing. Almost three-fourths of the children (74%) did not believe that the number "13" brings bad luck, even though 20% suspected number "13" was the bearer of bad tidings. Likewise, 45% did not believe that breaking a mirror, walking under a ladder or letting a black cat cross your path is cause for several years bad luck. Among those who showed a thread of superstition, breaking a mirror as an omen of bad luck had the greatest following (28%), followed by black cats (12%) and walking under ladders (10%).

HIGHLIGHTS FROM THE AGE 13 ASSESSMENT

The 13-year-olds also answered correctly those items which required knowledge of simple scientific facts, many of which were close to every-day experiences and personal observations. Most of this age group were able to make simple judgments based upon elementary scientific knowledge.

The 13-year-old student is aware of much of the common scientific data and phenomena about him. For example, 98% knew that a baby comes from its mother's body; brushing teeth prevents tooth decay (98%); fanning a fire makes it burn faster because of the increased oxygen (79%); cancer

cannot be controlled by a vaccine (78%); thick dark clouds are likely to bring rain (93%); 70 degrees is a comfortable school room temperature (86%); oxygen is the most abundant element in the human body (92%), and the lack of atmosphere on the moon would preclude such activities as building a fire or flying a kite (74%).

Some parents may be surprised to learn that 89% of this age group can select a group of foods which represent a balanced meal (e.g. steak, bread, carrots and milk), from among five alternative lists.

The 13-year-olds were able to answer correctly many questions requiring knowledge beyond everyday observation, such as facts about prehistoric man, the formation of sedimentary rocks, the movement of air masses, and elementary physical and biological science. 65% had some understanding of the characteristics of sedimentary rock, and a similar percentage (63%) could identify features of prehistoric man. Predicting the movement of air masses was recognized by 59% of the students as a more important factor in predicting weather than noting the extremes of humidity, wind speed, and temperature.

Half of the 13-year-olds (51%) were aware of the principle of refraction as the scientific phenomenon which can make a spoon in a glass of water appear to bend sharply at the surface of the water. Slightly over half of the group (54%) knew that flower seeds develop from ovules rather than leaves, petals, roots or stems. The prime difference between hot and cold water was correctly identified by 61% as the speed of the water molecules.

The students in the 13-year-old age group did particularly well with a series of exercises requiring conclusions to be formed on the basis of tables and graphs, or by making judgments by selecting from several sets of data. One such exercise asked the students to select the scarcest element from a table listing weights of various common elements found in the human body. The correct element (sodium) was selected by 81%. From a graph noting the weight of guinea pigs, 71% of the age group were able to determine the effect of specific diets upon the animals. In another interpretation of graphs and tabular data, 61% were able to correctly figure the food needs of a dog. 75% were able to interpret data to determine which of three solid objects of the same volume weighs the most based on the amount of water each displaces. A correct scientific hypothesis was drawn by 83% of the respondents when they were asked why paint on one side of a house was deteriorated more than paint on the remaining sides (e.g. likely cause is wind and sun).

Thirteen-year-olds found difficulty when asked which is the center of the memory and intelligence system of mammals. 26% selected the correct answer "cerebrum" while 21% selected the alternate choice "cerebellum" and 11% chose "medulla." Another exercise asked for an explanation of why an ocean fish fossil was found on a mountain rock outcrop. Only 26% accurately identified the scientific explanation that the mountain had undoubtedly been raised up after the fish had died. About half (53%) thought the best explanation was that the fossil fish was carried to the mountain by a great flood.

This age had some difficulty in using and selecting scientific apparatus. Over half (64%) were able to achieve balance with two unequal weights on a beam balance. Very few (4%) were able to find out the density of a wood block using the beam balance and a weight of a known mass. About a third (36%) of the 13-year-olds were able to select from a variety of pieces of laboratory apparatus the equipment necessary to determine the boiling point of water. Only 38% were able to time correctly how long it takes a pendulum to swing back and forth 10 times.

Nearly three-fourths (73%) knew that the statement, "My dog is better than your dog," is not a question amenable to scientific inquiry, and 69% recognized that repeated measures of the same thing will usually yield successive results which are close to each other, but not all exactly the same. Mathematics was identified by 79% of the age group as one of the most useful skills in scientific research. 56% knew that the basic purpose of a scientific theory is to explain why things act as they do (compared to 22% of the 9-year-olds who were asked the identical question).

The assessment of attitudes of 13-year-olds toward science indicate that the majority (64%) are "sometimes" curious about why things in nature are the way they are, although only 8% indicated they "often" had such curiosity. 94% of the 13-year-old youngsters believe that women can be successful scientists; and 91% correctly believed that scientists do not always work in laboratories.

HIGHLIGHTS FROM THE AGE 17 ASSESSMENT

The knowledge and skills of 17-year-olds indicates a wide range of common knowledge as well as textbook information. The exercises which appeared to be the easiest for the age group were ones which seemingly involve "common" knowledge. High percentages of 17s knew that gasoline comes from petroleum (93%); that certain animals and plants such as snakes, road-runners and cactus are usually found on the desert (98%); that among five animals that have been found as fossils in rocks, only dinosaurs have never been seen alive by man (89%); which foods represent a balanced meal (95%); that a galaxy contains many stars (69%) and that the electric current in a copper wire involves mainly the movement of electrons (69%).

As the exercises required more knowledge or skill normally associated with class or textbook study, the number of correct responses decreased among the 17-year-olds. This type of knowledge was demonstrated by about half of the group: matter is made up of individual moving particles (58%); adrenaline acts as a stimulant to the heart (56%); the longer a rock falls, the greater its speed (54%); most chemical changes can be described as atoms rearranged into different molecules (54%); the higher of two musical notes has a higher frequency and shorter wavelength than the lower (46%); the function of the placenta in a pregnant human female is to carry nourishment to the baby (41%); and mercury can be enclosed in glass to make a thermometer because mercury expands more than glass when both are heated together (56%).

The 17-year-olds also demonstrated some common misconceptions. An exercise asking of what metal cans for holding foodstuffs are chiefly made; 93% thought they were made of tin, while only 3% chose the correct response - - iron. Asked to choose a characteristic of birds but of no other animals, 27% selected the incorrect response "ability to fly", rather than "a body covering of feathers" which was correctly chosen by 52%. Slightly over a third (36%) knew that adding salt to water results in the water freezing at a lower temperature, while 28% thought it would result in the water evaporating faster.

More 17-year-olds than 9s and 13s answered "I don't know" to difficult exercises. When asked to determine from a chemical equation which two elements are oxidized, 41% indicated "I don't know", (6% answered correctly). Almost half (45%) said they didn't know the correct answer to an exercise regarding the amount of DNA in a mature egg and sperm cells (a question answered correctly by 34%). In another technical exercise, almost half (48%) replied "I don't know" to a question involving the number of ohms resistance in an electric circuit. Over half (54%) selected the "I don't know" when asked what was shown by experiments in which subatomic particles were shot at metal foil. 18% answered this exercise correctly, i.e. atomic nuclei would be more dense than the rest of the atom.

The 17-year-olds were able to perform well on several of the exercises using elementary scientific apparatus. 75% correctly used the beam balance on an exercise requiring the use of weights and distance. The

experiment with the use of a pendulum to measure the time for the pendulum to swing back and forth was performed correctly by 56% of the participants. Most of the age group was unable to use the apparatus to determine the density of a wood block, only 12% responded correctly while 63% gave an incorrect response and 25% did not answer.

When asked to give three reasons why the engine might not start again, if a car stops at a traffic light and the engine stops running, 85% were able to suggest at least two acceptable reasons.

The 17-year-olds showed varying degrees of success in interpreting data and offering scientific explanations for certain natural occurrences. In one exercise 68% recognized that if one part or member of an ecosystem (a meadow where rabbits eat grass and hawks eat rabbits) were disturbed, there would be consequences for other members of the system. 20% did not think upsetting the balance would affect other parts of the system. Many 17s found difficulty in analyzing an experiment to determine the loss of weight of growing seedlings. Only 18% identified the best explanation of a steady loss of weight of a flask which is planted with corn and stoppered with a one-hole stopper is that the seedlings use starch in the seeds and give off gases that escape. Almost as many (17%) chose the alternative, "The original water evaporates within the first day," and 29% said they didn't know.

When 17-year-olds were asked specific questions about scientific theories or descriptions, the percentage of correct responses was not particularly high. Few (29%) indicated they knew that Boyle's law, Charles'

law and Graham's law can be generalized in terms of kinetic-molecular theory. Almost half (47%) said they didn't know. That the theory of evolution was proposed by Charles Darwin was, however known by 68% of the group, although 19% said they did not know who proposed the theory. Uranium-lead dating was recognized by only 9% as a method to obtain accurate estimates of the age of the oldest known rock strata. A fourth (25%) of the 17-year-olds chose "radiocarbon dating" as the correct response, and 38% incorrectly thought that accurate estimates are determined by a "correlation of age of fossils contained in the strata."

HIGHLIGHTS FROM ADULT (AGE 26-35) ASSESSMENT

Much of the fundamental scientifc knowledge and skills demonstrated by the adult group may be considered in the area of "general knowledge" - - the type of information which they may have read in magazine or newspaper articles, or seen in television programs and "common knowledge", which is reinforced by regular and practical experiences. A high percentage of Adults knew facts which have medical connotations: adrenaline is a stimulant to the heart (70%); whooping cough is a disease which cannot be inherited (79%); testes produce sperm in mammals (67%); in an organ transplant, tissue rejection is least likely to occur if the donor is an identical twin (60%); chromosomes in a fertilized egg determine the sex of a human baby (91%); widespread vaccinations is why so few people in the U. S. get smallpox (95%); and in human females, the egg is released in about 14 days after menstruation begins (55%).

Certain biological facts were not known by a majority of the Adult groups. 36% of the Adults picked the cerebrum as the center of memory and intelligence in mammals. 31% correctly answered an exercise about the blood type of an offspring if the parents had OA and OB types (50% responded "I don't know"). 45% identified the function of the placenta in a pregnant human female.

Adults did better in other exercises. The theory of evolution was correctly associated with Darwin by 63%. The same percent (63%) knew that an electric current in a copper wire involves mainly the movement of electrons and that the purpose of a fuse in an electric circuit was to make the circuit safer (64%). Nearly two-thirds knew that flower seeds develop from ovules (62%). 85% were aware that the movement and characteristics of air masses are important in predicting weather.

Adults did about as well on some exercises requiring an analysis of facts, performing mathematical calculations and the handling of apparatus. 56% were able to figure the time required for a boat to travel down stream after knowing the speed of the boat and the river. When a rock falls from a cliff, 51% recognized that the longer the rock falls - - the greater the speed.. 89% were able to read correctly a graph relating to heartbeats of a person swimming. A beam balance exercise was performed correctly by 74% of the Adults, although only 12% could determine the density of a wood block after being given various bits of appropriate information. A quarter of the group (25%) knew that doubling the size of each dimension of a cube will increase its volume 8 times. The problem presented by a swinging pendulum was handled correctly by 49% of the Adults. This can be compared with 38% of the 13-year-olds and 56% of the 17-year-olds.

Relatively few Adults answered correctly highly technical questions on exercises involving knowledge generally learned in school or reinforced by formal education or related vocational experience. For example, only 26% knew that the periodic table was a chart showing relationships of chemical elements. 16% responded accurately to an exercise relating to the atomic weight of titanium. That uranium-lead dating has been used to obtain accurate estimates of the age of the oldest known rocks was known by only 3% of the Adults. A quarter of the respondents (25%) realized that atoms are rarely destroyed so that carbon atoms in a piece of bread could actually have been part of a dinosaur's body in ages past. A question about the wavelength of light waves traveling in a vacuum was answered correctly by 22% (light wave with higher frequency has shorter wavelength).

Adults chose to use the "I don't know" response category far more often than the other ages. Are adults more aware of their lack of knowledge and understanding of scientific facts and theory? Does greater maturity permit them to acknowledge lack of information more freely? Has more recent associated with multiple-choice tests made younger groups more willing to "take a guess" than to admit they do not know. For example, the amount of DNA present in a mature egg and sperm cell is identical in the same organism (67% chose "I don't know"); in the question relating to blood types 50% chose "I don't know."

OVERLAPPING EXERCISES

As noted before, identical exercises administered at several ages provide comparisons between the age levels. The correct responses suggest the expansion of knowledge and growth in skills as the age of the group increases from 9 to 13 to 17. The tendency then, however, is to observe a decrease in correct responses from the 17-year-olds to Adults in nearly all exercises associated with classroom experiences or textbook study. The 17s may have greater textbook type knowledge, although the "general knowledge" of the Adults seems greater in areas related to common experiences. The following examples illustrate these points for 13s, 17s and young adults in comparing the correct responses to overlapping exercises:

EXERCISE	13s	17s	Adult
Analyzing tables to determine weight of object	62%	81%	63%
Purpose of repeated scientific measurement	69%	72%	57%
Timing a pendulum	38%	56%	49%
Characteristics of air masses in predicting weather	59%	77%	85%
Effect of changing a member of an ecosystem	*	68%	52%
Adrenaline a heart stimulant	*	56%	70%
Function of placenta	*	41%	45%
Purpose of a fuse	*	49%	64%

* (Not asked of this age level).

The "I don't know" response can be compared on some of the overlapping exercises where identical questions were asked of 17-year-olds and Adults. In all but one of the following examples the adults selected "I don't know" more often than the 17s.

EXERCISE	17-Year-Olds Correct	17-Year-Olds I don't know	ADULTS Correct	ADULTS I don't know
Atoms are rarely created or destroyed	40%	11%	25%	25%
Uranium-lead dating	9%	15%	3%	43%
DNA in cells	34%	45%	21%	67%
Darwin theory	68%	19%	63%	30%
Egg release 14 days after menstruation	29%	18%	55%	11%

For some exercises there was little difference between 17s and young adults, thus when asked whether United States scientists are ahead of scientists of other countries in every field of research, the percentages who believe this were 17% and 19%, respectively. Those who did not believe the statement were 76% and 75%.

Differences in the interests and habits of the two age groups in watching scientific programs on television were revealed in an exercise which asked; "If you learn about a special television program dealing with a scientific topic, do you watch it?"

	17s	Adults
OFTEN	17%	29%
SOMETIMES	64%	56%
NEVER	19%	15%

DATA COMPARISONS

This report covers only the natinal results for the four age levels. Complete results for population groups (geographical, type of community, sex, etc.) are not yet available but will be reported later. In order to give

the public an understanding how the group comparisons will be assembled and presented, the national report on science includes comparisons of population groups of all 17s in 10 exercises.

Generalizations about kinds of knowledge in the various groups should not be attempted from the limited number of exercises presented for detailed analysis. Such evaluation should be reserved until complete results are available.

It is interesting, however, to inspect a few of these comparisons. In an exercise which asks a generalization about the kinetic-molecular theory 29% of all 17-year-olds answered correctly. Those from the Northeast answered correctly perhaps 8% higher (37%) than all 17s and those from the West perhaps 5% lower (25%). There was no noticeable difference in the responses when comparing the size of communities or comparing responses of males and females. On the same question 37% of the 17-year-olds whose parents had post high school education responded correctly or about 8% higher than all 17s, as did 15% of those whose parents had some high school but were not graduates, or about 14% lower than all 17s.

There is great national concern about the adequacy of Black educational achievement[3]. When the full science results have been analyzed National

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[3] Although National Assessment considered collecting data on other racial groups, the random sampling procedures did not provide sufficient numbers of persons from other minority groups to give meaningful and statistically reliable results.

Assessment will have a number of significant facts to report. From the analysis of a few illustrative exercises, it can be observed that there are no uniform differences between Blacks and non-Blacks in all exercises. Although in half of these 10 exercises the 17-year-old Blacks performed substantially below all 17-year-olds, in the other half the differences were negligible.

In the 10 exercises which were given detailed analysis, the 17-year-olds from affluent suburbs were higher or slightly higher than all 17s in half of the exercises. Those from impoverished inner cities were perhaps slightly lower in half of these 10. It would be premature to draw inferences from these limited results. It may prove to be as enlightening to compare exercises for which differences do not appear as it is to compare large differences from group to group.

Comparisons of the responses of 17-year-old boys and girls were also not consistent. In five of the detailed exercises there were no noticeable differences. One exercise, requiring the use of the beam balance apparatus, showed perhaps a 6% higher success by boys than by girls. The opposite result occurred in an exercise regarding the speed of a falling rock, where boys were perhaps 4% lower than girls.

In eight of the 10 analyzed exercises 17s whose parents' educational level was beyond high school were more often correct than all 17-year-olds.

A CONCLUDING OBSERVATION

Those interested in a detailed analysis of National Assessment national results in Science should consult the complete report available from the Education Commission of the States, 822 Lincoln Tower, 1860 Lincoln Street, Denver, Colorado 80203, or NAEP, Room 201 A Huron Towers, 2222 Fuller Road, Ann Arbor, Michigan 48105. Supplementary reports will be available in a few months to provide complete data and a variety of comparisons among groups.

National Assessment is the first nationwide effort to provide concerned citizens and educators with dependable information about how we, in the United States are attaining agreedupon educational objectives. As areas are assessed again, educational progress - - or its absence - - will be revealed and educational problems which require continuing attention may be identified. It is hoped that National Assessment reports will provide valuable indices of American educational results which will be useful in making educational decisions.